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ABSTRACT

The revised organizational structure for computing at The Medical University of South Carolina, the planned computer and telecommunications architecture, and the current state of implementation of these projects are discussed. Recommendations concerning resource management, software, and hardware are presented. The college had several different nonlinked computers serving different areas. To plan for optimal resource utilization, extensive interviews were held with high-level administrators throughout the institution to better define informational needs. A task force committee evaluated systems planning, institutional data management, processing and copying, and existing systems. It was proposed that rather than several computer centers under different directors, all operations should be managed by a single department of information resources management. The centralization of computer resources will make them available to a larger segment of potential users at lower cost. There also will be improved security and it will be possible to maintain integrity of existing software systems and applications while strategic plans are developed and implemented. (Author/SW)

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ORGANIZATIONAL RESTRUCTURING FOR BETTER INFORMATION RESOURCE MANAGEMENT

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ABSTRACT

Like many institutions, the Medical University of South Carolina had several different non-linked computers serving different areas. To plan for optimal resource utilization, extensive interviews were held with high-level administrators throughout the institution to better define informational needs. Recommendations concerning resource management, software, and hardware were formulated to better meet stated requirements. To implement these recommendations, we revised our organizational structure. Rather than several computer centers under different directors, all operations now are managed by a single Department of Information Resources Management. The revised structure of this department, the planned computer and telecommunications architecture, and the current state of implementation of these projects will be described.

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BACKGROUND

Until 1982, the development of computing resources at the Medical University of South Carolina had grown from a combination of two forces: 1) the recognition of the need to provide for the data processing requirements of administrative areas; and 2) the more individualistic requirements of faculty members and academic departments. There was no real perception of the need to anticipate needs, but instead, the University operated in an environment which most similarly reflected a free enterprise system distorted by readily available funds which allowed for the development of six computer installations, including Prime computers in the College of Dental Medicine, as well as the Departments of Medicine and Biometry, a Control Data System in the clinical laboratory area, a Digital Equipment system in the College of Pharmacy, and a Data General system in the Department of Family Medicine. Each of these systems was in an area reporting directly to the Vice President for Academic Affairs. In addition, the University's Computer Center, under the Vice President for Administration and Finance, operated an IBM 3033 system and associated equipment.

COMPUTERS AT MUSC

IBM 3033	Central Computing
Prime 750	Dental Medicine/Educational Services
Prime 550	Digital Equipment PDP 11 & 15
Prime 550	Biometry
Control Data 1784	Medicine
Data General C330	Laboratory Medicine
Family Medicine	Pharmacy

Although several of these systems performed well within their own areas, almost predictable problems began to surface. For example, there was almost no coordination or interface between the systems. Software development was left to the discretion of small users or was provided on a "what's available" rather than on a "what's needed" basis. Shrinking financial resources left operators of marginal systems in a situation where they competed for "business" to generate sufficient income to maintain operations.

To provide some coordination between the various computer operations, the University instituted a campus computer committee comprised of individuals with computer expertise from a variety of business and academic disciplines. This computer committee reported directly to the Vice President for Academic Affairs and was charged with the responsibility for planning efforts. Comprised primarily of suppliers of computer resources, the committee lacked detailed knowledge of University plans and was generally so divided in viewpoint that no single plan emerged for University computer operations. The

situation was made more complex by the fact that one major computing resource was under one Vice President and the other lesser computing resources were under the direction of another Vice President.

ORGANIZATIONAL CHANGES

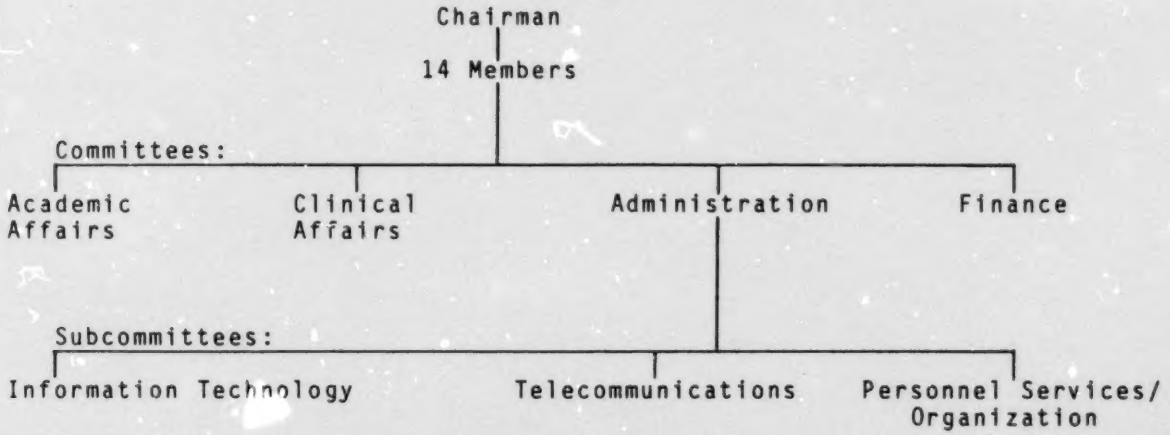
Approximately two years ago, the administrative structure of the Medical University underwent substantial change. One change that directly impacted upon computer operations was that the Office of the Vice President for Administration and Finance was abolished and two new positions were created, a Vice President for Administration and a Vice President for Finance. The management and coordination of all computing activities of the institution were assigned to the new Vice President for Administration. Under the new structure, a review of existing systems was initiated with a view towards reducing the number of operations and enhancing service to all segments of the University community. The early results of this initial effort led to a plan for the consolidation of work being accomplished on the three Prime computers and the integration of the surviving Prime 750 system into the Computer Center to be operated in juncture with the IBM mainframe.

About the time that the initial plan for the reorganization of University computer operations was completed, a new President took office at the University. One of the first things that the new President did was to establish a task force made up of business and industrial leaders from across the State to assist him and the vice presidents to identify ways to improve operations within the University. Emphasis was to be on the adoption of techniques and technologies that had proven to be successful in industry.

TASK FORCE

The Private Sector Task Force met initially in December of 1982 and formulated its purpose and methods of procedures. Its stated purpose was to review the management procedures as well as the overall situation of the Medical University. The ultimate aim was to recommend steps that could be taken to reduce costs and increase the efficiency of operations. A subcommittee of the task force was established to look at the overall application of information technology of the University with emphasis upon evaluating (1) systems planning, (2) institutional data management, processing and copying, and (3) existing systems. The Task Force was organized as shown on the following diagram:

PRIVATE SECTOR TASK FORCE



Upon the completion of its assignment, the Information Technology Subcommittee, headed by Mr. George Langston, Vice President for Corporate Services, J.P. Stevens Co., Inc., recommended the following:

1. The University should develop and implement an information systems plan related to its strategic objectives and mission. This plan should:

   a) promote the use of dynamic technology
   b) provide for planning, organization, and control of information resources
   c) build better communications and working relationships between administrators and systems users; and
   d) provide the means for obtaining the commitment and involvement of management internally and the support from resources externally.

2. Information services at the Medical University should be organized into a broader-based function that would:

   a) be headed by a director reporting to the Vice President for Administration
   b) include all office automation and telecommunications, as well as computer operations, systems development and maintenance, and data management and administration
   c) consolidate and realign existing data processing functions to free personnel for work on new systems and to increase productivity
   d) assign systems development personnel by functional areas; i.e., clinical affairs, academic affairs, administration, finance, with each development group headed by an experienced project manager

e) form a special team to implement a patient care system, and
f) institute new data management, including planning and control.

3. A primary function of data management planning and control operations is to devise methods to ensure successful implementation of the acquired information systems. Four methodologies were recommended:

   a) a standard system development methodology based on pre-defined systems life cycles and quality assurance reviews
   b) management-by-objectives (Odiorne, 1979) to begin in the information services area and extend to all areas of the University
   c) project management and control to track systems development projects and schedule status reporting, and
   d) use of standard business systems planning (IBM Business Systems Planning, 1981) to complete development of the information system plan.

4. To establish proper overall control, an interim high-level management steering committee should be established that would:

   a) include the University president and four vice presidents
   b) guide and direct the development of new information systems
   c) set priorities over resources
   d) act as a sounding board for strategic issues, automated equipment selection, staffing, and operating policies
   e) meet as required, but not less than quarterly, until the University makes the full transition from computer management to data resource management when this steering committee would terminate
   f) deal with strategic rather than operational matters.

5. Major changes are required in the current operational systems of various Medical University computers. These changes should satisfy increasing demands for more timely, accurate, and complete information. Also, they should offset the critical need for maintenance and interfaces to exchange data and align hospital systems with University business objectives in anticipation of new regulations governing inpatient services and costs. Ultimately needed is a network of information systems and supporting data bases to provide an information resource function that would:

   a) be rationally designed and implemented similar to an architect's plan

b) be modular in concept, taking into account existing operational systems and needs to properly interface them until they are part of the network
c) have all data planned, managed, and controlled like any other university asset shared across organizational lines. (Association of American Medical Colleges (1982).

6. The task force administration committee made specific recommendations concerning the most needed information systems in the areas of patient care, education, research, finance, and administration. They noted that some of these systems are in place and should continue as is and some should be enhanced, replaced, or redeveloped into a new system. They further noted that the next phase in the development of these information systems should include specific requirements for each of the systems, including establishment of systems and data interrelationships. The interrelationships of education, patient care, and research involve systems that must be designed to meet overall university needs and complement the needs of other functions. Designs must eliminate fractionalized data files, inaccessible data, and inconsistent systems. Without duplicating functions, these systems must support the University's major divisions which are interdependent on shared data.

7. An office automation function should be established, reporting to the director of Information Resources Management, with authority to review and approve all office automation systems. A strategic office automation plan should be developed, along with the detailed plan for implementation of the word processing phase. Copying resources should be centralized through an implemented cost reduction program. All printing should be consolidated and placed under the administrative control of the Vice President for Administration. A computer-interfaced microfiche processor should be purchased and made available throughout the university.

8. The existing centrex telephone system should be replaced with a modern electronic, private branch exchange. This computerized exchange should be able to support voice as well as data telecommunications.

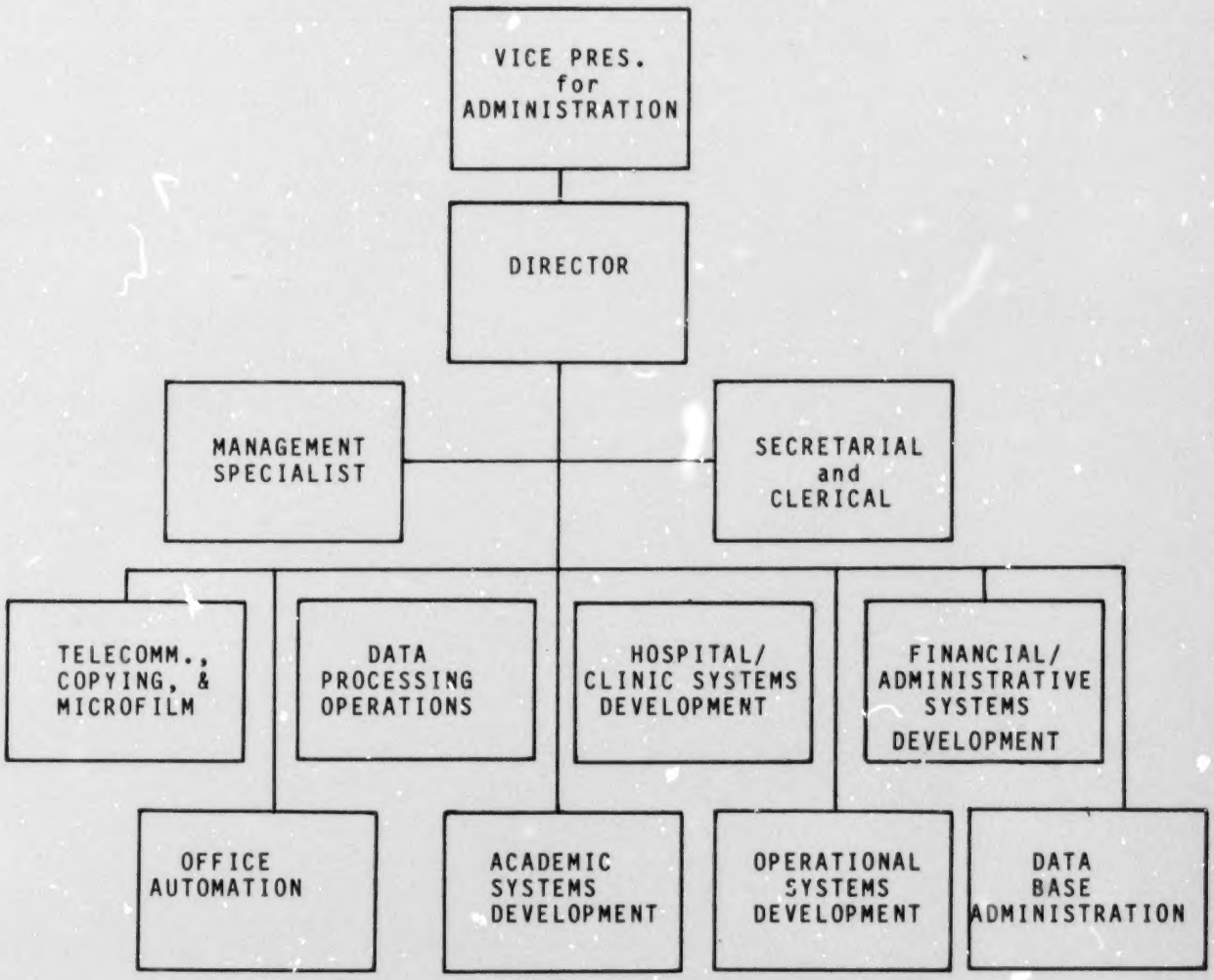
The task force felt that existing Medical University computer hardware was sufficient to meet current and near-future needs but they recommended that work currently being performed on the Prime 550 computers be migrated to the Prime 750 computer and that work currently being performed on the Digital Equipment computers in the College of Pharmacy be relocated to the IBM 3033 computer. This proposed centralization of computer resources will make them available

to a larger segment of potential users at lower cost. There also will be improved security of data and equipment, increased productivity of operational staff and equipment, and it will be possible to maintain integrity of existing software systems and applications while strategic plans are developed and implemented.

CURRENT ORGANIZATIONAL STRUCTURE

Based upon the task force recommendations and with the support of the Board of Trustees and the central Administration of the institution, in July of 1983 a Department of Information Resources Management (DIRM) was created and an acting director appointed. Since that time there have been shifts of existing personnel, as well as the creation of new positions, to accomplish the reorganization recommendations discussed above. Our current organizational structure is as follows:

INFORMATION RESOURCES MANAGEMENT



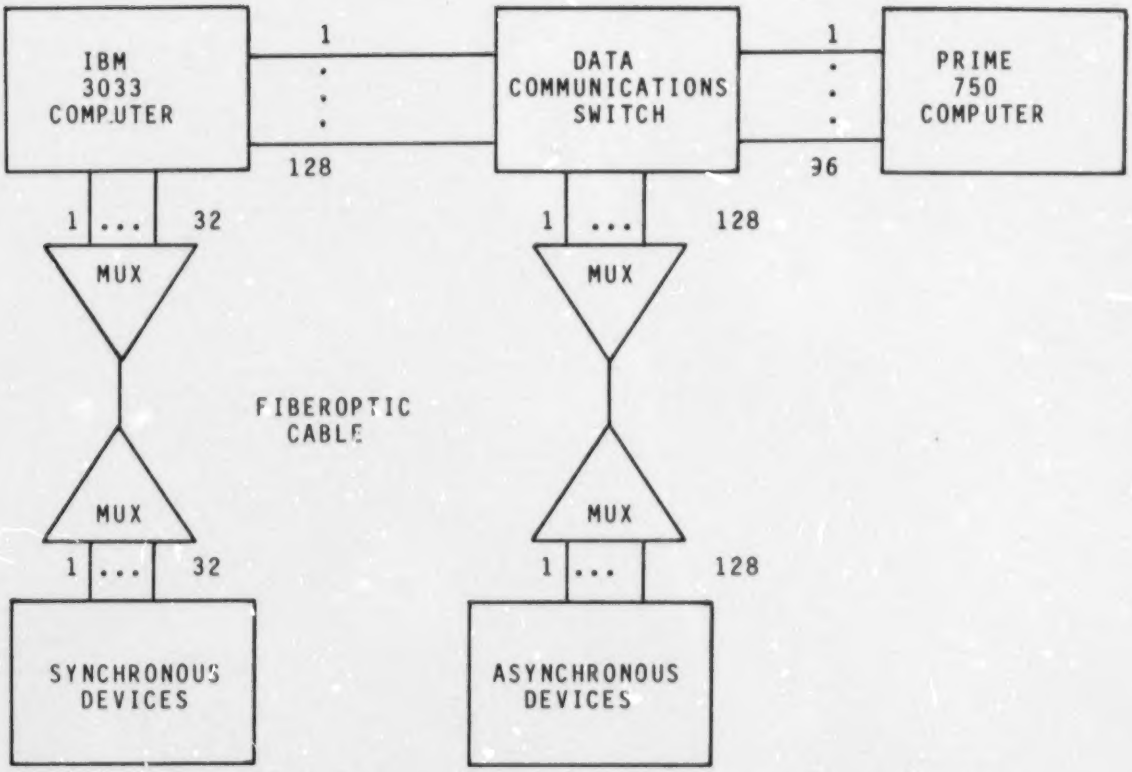
Specifically, a telecommunications, copying, and microfilming group now reports directly to the director of DIRM. Second, a manager of office automation systems position was created and filled. More recently the office automation efforts has been strengthened through the establishment of a training specialist position and the recruitment of an individual who works with users throughout the institution to assist them in fully utilizing their word processing and office automation equipment. Efforts also have moved forward to strengthen operations in the area of data base management and thereby prepare for a continuation of the information systems planning recommended by the task force. With regard to applications systems development, new higher-level managerial positions have been established in the academic, hospital/clinical, and financial/administrative areas, and individuals with training at the master's degree level will fill these jobs. For example, a manager of academic systems development already has been recruited and is working closely with the Vice President for Academic Affairs and the deans of the various colleges to review existing systems and prioritize efforts to change them or acquire new ones. Recruiting efforts are now underway to find comparable individuals for the Hospital/Clinical and Administrative/Financialtwo managerial applications systems development positions. At the present time a high percentage of effort in our applications software areas concerns maintenance of existing systems. A new managerial position to oversee operational software systems maintenance has been created and further restructuring of the DIRM organization will be necessary to implement this task force recommendation. The efforts of the above groups all are supported by centralized secretarial, clerical, and management specialist functions. By providing these latter individuals with office automation equipment as well as easy access to computerized information, relatively few individuals are able to support the many groups noted above.

More recently the Medical University has established an Office of Institutional Planning and Research which also reports directly to the Vice President for Administration, as does DIRM. This new office is working closely with DIRM in planning for systems to support university-wide academic and administrative needs.

CURRENT HARDWARE/SOFTWARE IMPLEMENTATION STATUS

To implement the hardware and software recommendations of the task force, DIRM is installing a University-wide fiber-optic cable network into all academic, clinical, and administrative areas. The following diagram depicts the proposed system:

CURRENT TELECOMMUNICATIONS PLAN



At the user end of the network, the fiber optic cables will be terminated by multiplexors which will connect directly by coaxial or twisted-pair cable to workstations and printers. At the computer end of the network, the fiberoptic cables also will terminate with multiplexors which will then be connected through a data communications switch to controllers associated with either the IBM 3033 or Prime 750 computer. As recommended, DIRM will move the Prime 750 computer from its remote location in the University to a central location in the same area as the IBM 3033 computer. This will meet many of the recommendations of the task force with regard to consolidation and security of resources and will allow for better management of the software associated with these two systems. Because there are many asynchronous as well as synchronous workstations deployed throughout the University, DIRM currently is considering a data communications processor which would afford port selection/contention and protocol conversion capabilities. Such a device would be interposed between the Prime 750 and IBM 3033 computers. Users with asynchronous devices could then

perform academic computing on the Prime 750 computer or office automation and other business functions on the IBM 3033 computer. At the present time the office automation group is working with staff throughout the institution to plan for acquisition of workstations which will be compatible with the network being installed. To this end in January we will begin installation of IBM's PROFS* system on our IBM 3033 computer for office automation. In anticipation of this we are acquiring numerous microcomputers. For example, recently our College of Pharmacy, working in conjunction with DIRM, has decided to replace its aging Digital Equipment computers with IBM PC XT microcomputers with associated hard-disk storage capability. This, too, fits into the pattern of recommendations of the task force since the College of Pharmacy will be able to interface these embedded-processor devices with the IBM 3033 system for downloading of data and transmission of documents as needed. In addition, several of the multiplexors and controllers associated with the fiberoptic cable network will be linked to 3278-type terminals (with attached light pens) for support of IBM's Patient Care System (PCS*) which currently is being installed. The patient management portions of this system will be available for use by hospital personnel in mid-January of 1984. To support the additional capability required to implement the task force recommendations, DIRM is installing additional memory on the IBM 3033 and Prime 750 computers and also is installing IBM's VM/SP* software product. This latter software enhancement is required as a prerequisite for IBM's PROFS* office automation system. The University also plans to obtain new commercially-packaged financial and personnel software. The rapid pace of recent events has been expedited because of our revised organizational structure.

ADDITIONAL CHANGES FOR THE NEAR FUTURE

Although many changes have been made in the organizational structure of DIRM since its inception six months ago, additional changes are still anticipated. First, the office automation group will probably continue to grow and develop, perhaps requiring the additional services of both a hardware maintenance engineer and one or more individuals who can assist users with the programming of their microcomputers. It may also be advisable to consider a closer organizational relationship between the office automation group and the telecommuncations, copying, and microfilming group since both of these activities are closely related to office efficiency. Second, much change yet must take place in the applications systems development area, in terms of personnel, reporting structures, and actual job involvement. Third, an operational systems maintenance group must be developed and training and responsibility for existing software shifted to that group. And finally, additional changes need to be made in the central management of DIRM such that the director has fewer people reporting directly to him but those who do must have both the expertise and authority to assume a wider range of responsibilities.

In the systems area many things still remain to be done. First, in the area of telecommunications much work remains to assure that individuals who wish to interface their equipment to the network can do so in the most efficient and cost effective manner. Second, the actual installation of the PROFS office automation system must yet be performed and training provided. Furthermore, to better support the new financial and personnel packages, the technical support group of DIRM will implement the MVS operating system, which is important to us not only to support these packages but also to allow us to prepare for a fourth-generation language for easier query capability and software development (Martin, 1982). Other major areas which will require extensive involvement of DIRM personnel in close support of users include the implementation of a computerized library system (Goldstein, 1983; Matheson and Cooper, 1982), the full implementation of the Patient Care System (Mishelevich and Van Slyke, 1980), and the replacement of our Shared Hospital Accounting System. We feel that each of these efforts will be expedited by the implementation of our new organizational structure.

While the efforts recommended by the task force are being implemented, new planning must be initiated to complement and augment those recommendations as we move forward into 1984 and the years beyond. In particular, detailed planning for integrated data bases will require much time and effort. Other benefits which will derive from this continued planning will be better standardization of our systems and better communication with users.

SUMMARY AND CONCLUSIONS

As the Medical University looks back over the last decade, there is little doubt that the progress which is now being made in the Information Resource Management area would not have been possible without the organizational restructuring discussed above. As noted by Synnott and Gruber (1981), the structure of the Information Resource Management function should mirror the structure of the institution. Now that this has occurred at the Medical University we are able to vigorously move forward toward the integration of our information resources for the benefit of all users. As a result of this restructuring, we feel we will be able to operate in a more productive and cost-effective manner.

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